REMARKS

Applicants request reconsideration of the above-identified application in view of the above amendments and following remarks.

A. Status of the Claims and Summary of Telephone Interview

At the outset, Applicants express their sincere gratitude for the courtesies extended by the Examiner during the telephone interviews on June 24, 2010 and July 19, 2010, during which the pending rejections were discussed as well as disclosures of the three cited references.

Claims 1, 3, 5, 6, 8-10, 12-15, 17, 24, 25 and 27-31 were pending when the pending office action was issued. This paper amends claims 1, 5 and 10, and cancels claim 31 without prejudice or disclaimer.

This paper adds the phrase "an interior volume of the porous structure of the polymeric sheet is substantially occluded by the ion-exchange resin" to claim 1. Claims 5 and 10 are amended similarly. Support for these claims is throughout the application as originally filed, including for example:

Location	Disclosure
page 16, lines 3-5	"The pores can be … fully imbibed with ion exchange medium such as an ionomer in an alcohol solution such as is commercially 5 available from Ashai [sic. Asahi] Glass such as Flemion® solution in ethanol."

Location	Disclosure
page 16, lines 12-15	"The space between the nodes and fibrils is then filled, preferably, completely (i.e., no air flow through) with the polymer electrolyte. Preferably the interior volume of the sheet is substantially occluded by the electrolyte."
page 27, original claim 10	"10. The membrane of claim 1 wherein … said ion-exchange resin fills substantially all pores of the expanded porous PTFE."

From reviewing the above referenced passages, as well as the balance of the originally-filed specification, one skilled in the art would recognize that the applicant was in possession of the claimed subject matter as a whole at the time of filing. Specifically, the cited passages disclose that the interior volume of the porous polymeric sheet, i.e., all of the pores, is substantially occluded by electrolyte and/or ion-exchange resin (Flemion® being a known ion-exchange resin). Entry of these amendments is respectfully requested.

The office action contains two rejections of the previously pending claims. First, claims 1, 3, 8, 9, 12-15, 24 and 25 were rejected pursuant to 35 U.S.C. § 102(b) as allegedly being anticipated by Eur. Pat. No. 0 503 147 A1 ("Ohashi"). 1/21/10 office action at pp. 2-3. Second, claims 5, 6, 10, 15[1] and 17 were rejected pursuant to 35 U.S.C. § 103(a) as allegedly being unpatentable over Ohashi in view of U.S. Pat. No. 6,059,943 to Murphy et al. ("Murphy") and U.S. Pat. No. 5,147,722 to Koslow ("Koslow"). 1/21/10 office action at pp. 3-4.

[1] Claim 15 was erroneously listed in both rejections.

However, the office action did not address pending claims 27-31, which were added by the October 21, 2008 Amendment. During the June 24 telephone interview, Examiner Martin explained the status of these claims as follows:

- Claims 27-29 were rejected pursuant to 35 U.S.C. § 102(b) as allegedly being anticipated by Ohashi
- Claim 30 was rejected pursuant to 35 U.S.C. § 103(a) as allegedly being obvious over Ohashi
- Claim 31 was rejected pursuant to 35 U.S.C. § 103(a) as allegedly being obvious over Ohashi in view of Murphy

Applicants request withdrawal of these rejections for at least the reasons discussed below.

B. **Claims 1, 3, 5, 6, 8-10, 12-15, 17, 24, 25 and 27-30 Are Patentably Distinct From Ohashi Alone Or In Combination With Murphy and Koslow**

Applicants respectfully traverse the rejections of claims 1, 3, 5, 6, 8-10, 12-15, 17, 24, 25 and 27-30. Applicants' independent claim 1 recites:

> "1. An integral, substantially air impermeable polymeric membrane for use in an electrochemical apparatus or process comprising:
>
> a) a polymeric sheet comprising polymer and having a porous structure with a microstructure of fibrils,
>
> b) the polymeric sheet having distributed in the polymer:
>
> i) metal;
>
> ii) an organic polymer; or
>
> iii) a combination thereof, and

> c) said porous structure being at least partially filled with an ion-exchange resin to provide ionic conductance for use in the electrochemical apparatus or process,
>
> wherein an interior volume of the porous structure of the polymeric sheet is substantially occluded by the ion-exchange resin."

None of the three cited references, Ohashi, Murphy and Koslow, teaches, discloses or suggests "an interior volume of the porous structure of the polymeric sheet is substantially occluded by the ion-exchange resin" as recited in independent claim 1.

1. *Ohashi's Saponified Copolymer, Which Is Alleged To Be An Ion Exchange Resin, Does Not Substantially Occlude The Porous Structure Of the Fluoropolymer Substrate*

Ohashi, the main reference in all of the rejections, discloses a metallized porous fluorinated polymer and "provid[es] a method for efficiently forming a metal film on the surface inside of the pores." Ohashi, p. 2, lines 30-33. A two-step method achieves this result. First, a hydrophilic polymer coating is bonded to the inside surface of the pores of a porous fluoropolymer substrate. Ohashi, p. 2, lines 37-38. Second, a metal film is formed on the surface inside of the pores on top of the hydrophilic polymer coating. Ohashi, p. 2, lines 40-41.

The office action suggests Ohashi's hydrophilic polymer coating corresponds to Applicants' ion exchange resin. 1/21/2010 Office Action at p. 2 (citing page 10, lines 20-38). The cited passage describes Ohashi's "Reference Example 1." In

that example, a porous fluorinated resin film (*i.e.*, the substrate) is "impregnated" with a methanol solution having dissolved, saponified copolymer of TFE and a vinyl acetate. Ohashi, p. 10, lines 22-26. Applicants understand the office action asserts that the saponified copolymer is an ion exchange resin, although Ohashi doesn't describe it as such.

Nevertheless, the saponified copolymer does not substantially occlude an interior volume of the porous structure of the polymeric sheet. In the cited Reference Example 1, the substrate starts with 80% porosity. Ohashi, p. 10, lines 25. After the impregnation with the saponified copolymer, the resulting film remains porous – having 70% porosity. Ohashi, p. 10, lines 28-29.

Consistent with this reference example, Ohashi repeatedly describes the end product as porous:

- "a ***porous*** fluorinated polymer material" [p. 2, lines 42-45].[2]
- "a process for manufacturing a ***porous*** fluorinated polymer" [p. 2, lines 46-47].
- "metallized ***porous*** fluorinated polymer of the present invention" [p. 8, line 13].
- "a metallized ***porous*** fluorinated polymer" [p. 8, line 26].

Nothing in Ohashi suggests the pores of the fluoropolymer substrate are substantially occluded by the saponified copolymer. Given Ohashi's purpose, i.e., to

[2] Throughout this paper, all emphasis has been added unless otherwise noted.

subsequently coat the interior of those impregnated pores with metal, the pores cannot be occluded:

> "In the present invention, since a porous fluorinated polymer to which a hydrophilic polymer has been bonded is used as the raw material to be plated, a metal film can be easily formed ***on the inside surface of the pores*** of this material through chemical plating." [Ohashi, p. 7, line 58 – p. 8, line 2].

Ohashi discusses using the impregnated fluoropolymer as a ***generally porous***, gas diffusion electrode even after the metal plating step, re-affirming that it remains porous after further processing:

> "The present invention can provide a highly efficient gas diffusion electrode by laminating a porous fluorinated polymer sheet over metallized polymer sheet that has a platinum film. Gas diffusion electrodes are ***generally porous electrodes*** in which one side is in contact with electrolyte and the other side is in contact with a reaction gas. On the inside of the gas diffusion electrode is formed a three-phase interface of the electrode, the reaction gas, and the electrolyte. In addition to chemical resistance and corrosion resistance, gas diffusion electrodes must also have a function that prevents the leakage of electrolyte on the reaction gas side and the bubbling of the reaction gas to the electrolyte side." [Ohashi, p. 8, lines 33-39].

Thus, Ohashi fails to teach, disclose or suggest "an interior volume of the porous structure of the polymeric sheet is substantially occluded by the ion-exchange resin" as recited in independent claim 1.

2. *Murphy Discloses An Ion-Exchange Membrane With Proton Conducting Oxide Particles, And Does Not Have Ion Exchange Resin Substantially Occluding The Pores*

Murphy, the secondary reference in the obviousness rejections, discloses a "composite membrane comprising an oxidation resistant polymeric matrix filled with inorganic oxide particles forming a connected network extending from one face of the membrane to another face of the membrane." Murphy, Col. 8, lines 47-51. Figure 12 also shows this composite membrane:

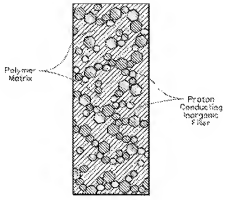

FIG. 12

There is no discussion in Murphy of ion exchange resin substantially occluding pores of the polymer matrix. To the contrary, Murphy teaches that the polymer matrix itself may be a kind of ionomer, perfluorosulphonic acid (PFSA). Murphy, Col. 8, lines 58-64 and Col. 10, line 64 – Col. 11, line 8 ("Nafion" for the "polymer matrix"). Moreover, the PFSA membrane is not characterized by Murphy as having pores or being porous.

"Oxide proton conductors" are incorporated into the polymer matrix in several ways. Where a non-porous polymer matrix is employed, the oxide proton conductors may be used as "fillers." When a porous polymer matrix is employed, the oxide proton conductors may fill the pores.

These oxide proton conductors are described in the background section. Murphy, Col. 10, lines 62-64. Examples include "metal oxides," and other "oxides which do not fit this description" such as "silica (SiO_2) and alumina (Al_2O_3)." Murphy, Col. 2, line 66 – Col. 3, line 9. Importantly, these proton conducting oxides are not ion exchange resins, but are "***[a]lternatives*** to polymer proton conductors." Murphy, Col. 2, lines 65-66.

The office action refers to Murphy's claim 1 as allegedly disclosing "ion-exchange ***particles***" that partially fill a porous structure. See p. 4. This is not relevant. Murphy's oxide particles are not resin, and Murphy certainly never discloses a porous membrane having ion exchange resin filling its pores.

Thus, Murphy fails to teach, disclose or suggest "an interior volume of the porous structure of the polymeric sheet is substantially occluded by the ion-exchange resin" as recited in independent claim 1.

3. *Koslow's Composite Membrane Has Empty Pores And Does Not Have Ion Exchange Resin Substantially Occluding The Pores*

Most generally, Koslow advocates a composite membrane formed of a "binder material" and "a primary material." The "binder material" can be nearly any thermoplastic material. Koslow, Col. 7, lines 59-60. The "primary material" or "primary particles" can include "ion-exchange resin." Koslow, Col. 8, line 66 to Col. 9, line 6. The office action cites Koslow, the tertiary reference in the obviousness rejections, for its disclosure of fumed silica as another kind of primary particle in his composite membrane. 1/21/10 Office Action at p. 4.

Importantly, Koslow describes the final composite as having empty pores filled with air, and not filled with ion-exchange resin:

- "composite material composed of primary particles, a binder resin phase forming a continuous web matrix or point bonds, and ***a volume of empty pores***." Abstract.
- "The present invention comprises a process for producing three-phase structures, the three phases comprising primary particles, binder, and ***air (or gas)***." Col. 4, line 38-40.
- "The matrix … constitutes only a small part … of the overall volume. Consequently, voids are present within the resulting structure…. As a result, the structures formed are permeable and ***have large volumes of pores filled with air*** or other atmospheric gas." Col. 5, lines 27-34.
- "[T]he compositions of this invention are characterized by … ***large amounts of air (or other atmospheric gas) filling the remaining voids*** between the primary particles." Col. 17, lines 24-28.

Consistent with this discussion, Koslow describes that materials produced by his invention include "sorbent structures" such as "ion-exchange resins."

Thus, Koslow cannot be relied upon to alleviate the deficiencies of Ohashi and Murphy discussed above, because it also fails to teach, disclose or suggest "an interior volume of the porous structure of the polymeric sheet is substantially occluded by the ion-exchange resin" as recited in independent claim 1.

CONCLUSION

Applicants respectfully assert this Application is in condition for allowance, and request an early and favorable examination on the merits. The cited references do not make out a *prima facie* rejection for anticipation or obviousness, because Ohashi, Murphy or Koslow fail to disclose the subject matter of claim 1, including "an interior volume of the porous structure of the polymeric sheet is substantially occluded by the ion-exchange resin" as recited in Applicants' independent claim 1. Independent claims 5 and 10, and dependent claims 3, 6, 8, 9, 12-15, 17, 24, 25 and 27-30 are patentably distinct for at least similar reasons.

Applicants have chosen in the interest of expediting prosecution of this patent application to distinguish the cited documents from the pending claims as set forth above. These statements should not be regarded in any way as admissions that the cited documents are, in fact, prior art. Likewise, Applicants have chosen not to swear behind

Murphy, cited by the office action, or to otherwise submit evidence to traverse the rejection at this time. Applicants, however, reserve the right, as provided by 37 C.F.R. §§ 1.131 and 1.132, to do so in the future as appropriate. Finally, Applicants have not specifically addressed the rejections of the dependent claims. Applicants respectfully submit that the independent claims, from which they depend, are in condition for allowance as set forth above. Accordingly, the dependent claims also are in condition for allowance. Applicants, however, reserve the right to address such rejections of the dependent claims in the future as appropriate.

In the event that a telephone conference would facilitate the examination of this application in any way, the examiner is invited to contact the undersigned at the number provided.

THE COMMISSIONER IS HEREBY AUTHORIZED TO CHARGE ANY ADDITIONAL FEES WHICH MAY BE REQUIRED FOR THE TIMELY CONSIDERATION OF THIS AMENDMENT UNDER 37 C.F.R. §§ 1.16 AND 1.17, OR CREDIT ANY OVERPAYMENT TO DEPOSIT ACCOUNT NO. 50-4827, ORDER NO. 1004272.108US.

Respectfully submitted,
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